



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII  
901 NORTH 5TH STREET  
KANSAS CITY, KANSAS 66101

AUG 18 1999

Valerie Shippers (Attn.: AMSAM-RA-EMP-MP)  
US Army Aviation and Missile Command  
Building 112, Room 101  
Redstone Arsenal, Alabama 35898-5000



Dear Ms. Shippers:

This letter is to inform you that the Environmental Protection Agency (EPA) Region 7 has completed the review of the draft Environmental Baseline Survey (EBS) and other material available in performing a Federal Facility Preliminary Assessment Review (FFPA). The FFPA report for the St. Louis Army Ammunition Plant (SLAAP) site, located at 4800 Goodfellow Boulevard, St. Louis, Missouri, is attached. This report was performed by the EPA's contractors and reviewed and approved by the EPA. As part of the report data gaps for each pathway and a Hazardous Ranking System Deficiency Checklist is provided to assist you.

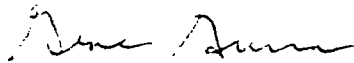
The EBS and other material in the state of Missouri and the EPA's files have been evaluated in accordance with the EPA's September 1991 "Guidance for Performing Preliminary Assessments Under CERCLA" and section 420 of the National Oil and Hazardous Substance Pollution Contingency Plan (40 CFR Part 300), commonly known as the NCP. The appendix (A) of the NCP is EPA's Hazard Ranking System (HRS) used to evaluate sites for inclusion on the National Priorities List (NPL). From the evaluation of your documents, EPA has determined that the SLAAP site needs further investigation to fill in the data gaps for complete path way analysis and HRS evaluation.

In the attached report the draft HRS scoring information and all references to the scores have been removed. HRS scoring and the listing of sites on the NPL is a rule making process within EPA and this information is withheld until the Agency makes a listing decision.

The status of this facility in the Federal Agency Hazardous Waste Compliance Docket will be reviewed and updated and a qualifier of high (H) will be placed in CERCLIS database for this site indicating that further investigation is required.

If you have any questions regarding the EPA's evaluation of this site, please contact Diana Bailey of my staff at (913) 551-7717 or e-mail her at [bailey.diana@epa.mail.gov](mailto:bailey.diana@epa.mail.gov).

Sincerely;



Gene Gunn  
Branch Chief  
Federal Facilities and Special Emphasis  
Superfund Division

Enclosures

cc: Don Kerns, MDNR/Fed. Fac. Section, HW Program  
Kevin McGraew, St. Louis Development Corporation.  
W. James Biederman, US General Services Administration,  
Kerry Herrdon w/o enclosures

## **MEMORANDUM**

**TO:** Paul Doherty, EPA/START PO

**FROM:** Martha Kopper, E & E/STM  
Patty S. Roberts, E & E/STM

**THRU:** Robert C. Overfelt, CPG, E & E/START PM

**DATE:** July 29, 1999

**SUBJECT:** Final Federal Facility Preliminary Assessment Review for St. Louis Army Ammunition Plant at 4800 Goodfellow Boulevard, St. Louis, Missouri.

CERCLIS ID: MO4210021222  
TDD: S07-9902-008  
PAN: 1165SLTGFF  
EPA/FFSE: Diana Bailey

### **INTRODUCTION**

The Ecology and Environment, Inc. (E & E), Superfund Technical Assessment and Response Team (START) was tasked by the U. S. Environmental Protection Agency (EPA) Region 7 Federal Facility Special Emphasis (FFSE) program to conduct a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Preliminary Assessment (PA) review of the St. Louis Army Ammunition Plant (a.k.a., SLAAP, formerly part of the St. Louis Ordnance Plant) located at 4800 Goodfellow Boulevard, in St. Louis, Missouri.

The specific elements of this task included a file review, assessing the sources and pathways of any contaminants for the entire site, listing data gaps and completing a PA score for the SLAAP facility. These tasks were achieved through a review of available file information, interviewing State representatives knowledgeable of the site, and completion of the PA scoring worksheets and Hazard Ranking System (HRS) scoring deficiency checklist. Available file information included a draft Environmental Baseline

Survey (EBS) report completed by Tetra Tech EM Inc. (Tetra Tech), for the U.S. Army Aviation and Missile Command in Huntsville, Alabama. Available file information did not contain a CERCLA PA or a Site Inspection (SI) report for review. Limited Missouri Department of Natural Resources (MDNR) documents were also obtained and provided some additional information concerning the SLAAP and the St. Louis Ordnance Plant (SLOP) operations. The only sampling information consisted of investigations concerning the remediation of the interior basement of Building #3 (contaminated with polychlorinated biphenyls [PCBs]) and the removal and remediation of underground storage tanks (USTs) located east of Building #3. Due to the limited information and sampling conducted for the site, the most conservative approach was evaluated for PA scoring. Attachments 2 and 3 include the PA score sheets and HRS scoring deficiency checklist.

## **SITE DESCRIPTION/LOCATION**

The SLAAP facility is located at 4800 Goodfellow Boulevard, in the city of St. Louis, Missouri. The geographic coordinates are latitude 38°40'1.53" N, and longitude 90°15'9.8" W.

The SLAAP facility is situated on Goodfellow Boulevard, south of I-70, and west of Riverview Boulevard in an industrial area (Attachment 1: Figure 1, Site Location Map). Goodfellow Boulevard runs north to south, and I-70 runs east to west in relationship to the site. To the south of the site are a number of warehouses, which at one time were part of the SLOP facility. One of the warehouses, owned by PURO Chemical Division, presently stores unknown bulk chemicals. Residential properties and commercial shops, (previously a part of the SLOP operations) are located approximately 250 feet to the west of SLAAP. A school, formerly on property operated by SLOP, is located about 500 feet southwest of the SLAAP property. The site is totally enclosed by a fence and two gated entrance ways.

The SLAAP facility is currently inactive. This approximately 21-acre complex consisted of 11 buildings (Attachment 1: Figure 2, Site Map). Presently, the property has eight unoccupied buildings that were used to house the main operating processes of the SLAAP facility. Buildings/structures removed from the facility include #7A (cooling tower), #8 and #8A (fuel oil storage area and oil pump house), #9 and #9A (acetylene generator and calcium carbide storage buildings), #9B (sludge pits), as well as buildings #9C and #9D (AST diox oxygen receiver and diox oxygen convertor). Two underground storage tanks (USTs), one located east of the Machining Building (#3), and the other located southwest of the Forge Building (#2) have also been removed. In addition, three quench oil tanks and a sludge pit have been removed from Building #10 and two former billet storage yards adjacent to Building #1 are now

paved parking lots. For the locations of the former and current buildings/structures, see Attachment 1, Figure 2.

Drainage from the operating facility was via sanitary/storm sewer drains that entered the Metropolitan Sewer District (MSD) system, which in turn flowed into the Mississippi River. It has been reported that a number of the buildings contained subfloor drains, pits, and piping, which eventually discharged into the MSD system. The site is nearly level, but is located near a topographic high point. Water flows to the north with lesser gradients to the east, west, and south. Rainwater that falls on the property eventually discharges to the St. Louis combined sewer system. No surface water is present on the SLAAP site. The closest body of water is the Mississippi River, which is about 2.65 miles east of the SLAAP property.

## **OPERATIONAL HISTORY AND WASTE TYPES**

The following information was obtained from available MDNR and EPA files and the draft EBS report. It comprises past and present operational history and waste types. Some waste treatment, storage, and disposal practices conducted at the former SLAAP facility are still unknown at this time.

General Electric Company/General Electric Realty Corporation owned the site property from January 1926 to April 1941. Subsequent to this date, the property was purchased by the federal government for construction of the St. Louis Ordnance Plant (operated by Chevrolet Motor Division as needed from 1945 until 1972). The SLAAP facility, composed of about 21 acres in the northern portion of SLOP, was purchased in 1941 (the same year SLOP began its operations). The St. Louis Ordnance Plant covered 276 acres, which included land to the west and south of the present SLAAP location. The mission of SLAAP initially was to manufacture 0.30-millimeter (mm) and 0.50-mm caliber munitions (from 1941 to 1944). From 1944 until 1969, SLAAP production consisted of 105-mm howitzer shells (from 1944 to 1945) for World War II needs. The buildings constructed for the initial small arms production included Buildings #3, #5, #6 and #9. Buildings added for the 105-mm howitzer shell production included #1, #2, #4, and #7 through #11 (except for #9). After World War II, SLAAP was placed on standby status. During the reactivation from 1951 to 1954 and from 1966 to 1969 the plant was again used to manufacture 105-mm howitzer shells for the Korean and Vietnam Wars. Subsequent to 1969, the SLAAP facility operations were placed on hold. In 1984, buildings at SLAAP were renovated for use by the U.S. Army Aviation Systems Command (AVSCOM). In 1985, portions of Buildings #3, #5 and #6 were converted into offices. In 1989, the Department of the Army determined that SLAAP was not needed to support its munitions program, and had the production equipment removed. From 1986 to 1990, SLAAP was under the

command of the U.S. Armament, Munitions and Chemical Command (AMCCOM). In 1990, plant ownership and control were placed under U.S. Army Aviation and Troop Command (ATCOM). As of 1972, plant maintenance and surveillance activities were subcontracted by Donovan Construction Company to Plant Facilities and Engineering (PFE), Inc. The facility is currently vacant and under the control of AMCCOM.

The draft EBS report generally discussed the physical settings and processes of the former SLAAP facility. The report also provided the current physical conditions of each unoccupied building and the site property which was observed during a site tour. Details regarding the processes which took place within each building during the various temporal periods, including the production of the 0.30-mm and 0.50-mm caliber small arms munitions between 1941 and 1944, were not incorporated into the report. As a result, certain materials and processes used, wastes generated, and locations of these processes are unknown for the SLAAP facility.

Other information obtained from MDNR was used to partially fill in these data gaps, particularly the production of the 0.30-mm caliber munitions between 1941 and 1944. The available information indicated that the SLAAP/SLOP facility during this time period produced 0.30-mm caliber munitions, tracer, armor piercing, and ball bullets. In general, cartridges were made up of three metallic components: the brass case (composed of 70% copper and 30% zinc), which held the explosive powder, the primer (composed of brass), which held the high explosive charge, and the bullet (composed of a brass jacket with a lead/steel core). Once the brass cartridge cases were thoroughly shaped and had gone through annealing heat application and pickling acid bath treatment processes, the primer insertion machine pierced flash holes at the head of the case, into which primers (small cap/tube containing an explosive) were loaded. Bullet jackets received slugs, which were inserted into the lead/steel cores (except for tracer bullets, which contained a core of chemical compounds, including phosphorus). Smokeless powder was added into the body of the cartridge for all small-arms caliber munitions for the final process. Lead was used for tracer bullet cores, inner tips of armor-piercing bullets and cores for ball bullets. A reported "Lead Shop" (exact location unknown) received the lead in 90-pound solid cylinders. Lead billets were then placed into a 40-ton extrusion press, which pressed the lead through dies, forming it into wire. The wire then went to the swaging machine where it was cut into lengths, fed into dies, and then formed into slugs. The available information did not indicate whether forging/heating of the molten slugs had occurred, but did indicate that quench and spray operations did occur within for the production of small arms munitions. The buildings utilized for this initial small arms production included buildings #3 (machining operations), #5 and #6 (primer loading/insertion operations), and #9 (smokeless powder canning operations). Contaminants and

wastestreams generated from the manufacturing of the initial small arms munitions probably included explosives (primer and tracer compounds), nitrates, and perchlorates, VOCs, and SVOCs (solvents, paints, and oils), emulsifiers, abrasives, and alkaline agents and acids. Other contaminants and wastes that may have been generated from the shell machining and primer loading processes would include metals, particularly lead, copper, and zinc, and PCBs from the use of cutting/soluble oils, quench oils and transformer oils. VOC contaminants from air emissions from painting/solvents and acid/metallic mists may also be present. Information concerning the 0.50-mm caliber munitions, including historical manufacturing processes and the locations of these processes, was not available.

The following information includes a brief description of each building formerly/currently located on the SLAAP property. Information, as stated earlier, is from the draft EBS report and other MDNR file information and interviews. A brief description of the historical manufacturing processes is also discussed for each building, as well as possible materials used and contaminants/wastes generated from the former processes. See Figure 2 for the location of the former and current building/structure.

The billet-cutting Building #1, during the 105-mm shells production, housed several processes, one of which consisted of utilization of acetylene gas torches to nick and break steel rods/billets into measured lengths. Hydraulic systems were employed in the break operation. The steel rods/billets were stored in storage yards located on either side of Building #1 (currently parking lots) before being transferred to Building #2 (Forge Building). The draft EBS report indicated that spray and quench operations using quenching fluids (composed of acids and solvents) and water were also conducted in this building. Some materials used during the billet-cutting processes include solvents, acids, quench water, cooling and hydraulic oils, and machine lubricants. Contaminants associated with the above-mentioned processes include VOCs, SVOCs, metals, and PCBs.

The #2 Forge Building contained 10 gas- and oil-fired rotary furnaces, which were used from 1944 to 1969 for the production of the 105-mm howitzer shells. In general, manufacturing processes within the Forge Building involved the slug shaping of the steel billets into projectiles through forging and heating operations, descaling units, hydraulic/piercing presses, and hydraulic drawing benches. Once shaped, the projectiles were cooled in spray and quench operations and then transported to Building #3 (Machining Building). Quench and spray operations involve the rapid cooling of hot castings by quenching in a water bath. These operations increased the cooling process and achieved certain metallurgical properties for the metals being prepared. The water may contain chemical additives to prevent oxidation. Other machinery used in producing the projectiles included sizing units, conveyors, accumulators, air hammers, cooling

tanks, oil heaters, cranes, metal grinders, transformers, and air compressor motors and cylinders. The draft EBS report noted that a pipeline tunnel entered building #2 from the north; the tunnel contained pipes that run from the former locations of the fuel oil storage tanks area (Building #8), and the fuel oil pump house (Building #8A). The first floor of building #2 once contained the fuel oil distribution system, hydraulic oil systems, and cooling tanks. The second floor contained transformers and switches. A former gasoline UST once located outside of the building was also utilized in the operations of Building #2. Some materials used in the forging and heating processes included solvents, acids, hydraulic oils, fuel oils, quench-water cooling oils/fluids, and machine lubricant oils. Contaminants associated with these materials and processes may include VOCs, SVOCs (including PAHs), PCBs, heavy metals, and possibly cyanide.

Furnace air emissions in Building #2 consisted of the products of combustion from the fuel and particulate matter in the form of dusts, metallics and metal oxide fumes. Carbon monoxide and organic vapors may also arise if oily scrap is charged to the furnace or preheat system. Particulates can include flash and heavy metals, and fumes are generated from the volatilization and condensation of molten metal oxides. Particulates may contain varying amounts of zinc, arsenic, lead, nickel, cadmium, and chromium. Carbon steel dust can be high in zinc, stainless steel dust is high in nickel and chromium, painted scrap can result in particulates high in lead, nonferrous metal production may contain copper, aluminum, lead, tin, and zinc.

The initial manufacturing operations (from 1941 to 1944) within the #3 Machining Building included the production of 0.30-mm caliber munitions. The draft EBS report did not specifically discuss the production processes involved, materials used, or wastes generated from this time frame; however, other available information from MDNR helped in filling in these data gaps and was summarized previously in this section.

Subsequent to 1944, Building #3 was retooled for the production of the 105-mm howitzer shells. The updated manufacturing operations included: shell shaping, heat and metal treating, cleaning, stripping, preserving, painting, and packaging. The new machinery used in Building #3 included lathes, welding equipment, hydraulic and drill presses, milling machines, grinders, heat treating furnaces, wash racks, welders, shapers, shot blasting equipment (to remove residual refractory material and oxides), paint spray booths, transformers, air compressors, dust collection devices, and conveyors. During this phase of munition production, the first floor of the building was used to store wastes (chemicals, oil, and greases) produced during these operations. The second floor was the location where the 105-mm shell casings were lathed and shaped with cutting/soluble oils containing PCBs. Metal shavings from this process were sent



to the basement through a "chip chute". SLOP records estimate that 146 tons of chip/metal shavings were generated every day, during their production rate of 650,000 shells per month. Greater amounts were generated when they attempted to reach a maximum capacity of 1 million shells per month. Records indicate that the chips/shavings were removed from Building #3 by using two-wheel chip carts to a chip chute/disposal elevator and finally into rail cars. The cleaning of the projectiles including chemical cleaning, and coating operations were done to remove scale, rust, oil, grease and dirt. Solvents, emulsifiers, pressurized water, abrasives, alkaline agents as well as acid pickling were used in these processes. The pickling process involved the cleaning of the metal surface with inorganic acids such as hydrochloric, sulfuric or nitric acids. The projectiles were coated and painted to prevent rust and to resist deterioration. Building #3 was also used for a machine, electrical, carpenter, and automotive shops. Wastes generated from the finishing operations probably included generation of particulate air emissions. Wastewater may have contained cutting oils, solvents and metals. Other wastes probably included metal chips and spent cutting oils. Wastes generated from the cleaning, coating operations and painting may have generated air emissions, and acid/metallic mists (including lead paint). Wastewater may have contained wash solutions including acids, solvents, metals, cyanides. Other wastes may include metal-bearing sludges, spent solvents and paints, (including lead paint). Contaminants associated with these wastes and the production processes of the 105-mm caliber shells include VOCs, SVOCs, heavy metals, and PCBs.

Building #4 (Air Compressor Building) formerly housed air compressors used to generate compressed air for processes performed in the other SLAAP buildings. Process machinery included compressor motors and cylinders, intercoolers and aftercoolers, and cyclone separators. It was reported in the draft EBS report that an electrical switching room located south of the air compressor room contained two transformers. Transformers were also once located immediately west of Building #4. Contaminants associated with these operations may include PCBs, VOCs, and possibly SVOCs.

Initial manufacturing operations, which occurred in Building #5, included a primer loading plant for 0.30-mm caliber munitions from 1941 to 1944 for the SLOP operations. In 1944, the building was converted to office space and was utilized as such until 1996, except between 1962 to 1967. During this time the building was utilized as an assembly plant and office which was leased to Futura Manufacturing Company for the production of small pocket-sized radios. No information was available regarding the processing and disposal practices of the Futura company. In addition, the draft EBS report did not indicate any areas of concern associated with the primer loading plant processes conducted in building #5 during the early 1940's. File information obtained from MDNR noted that brass was used for some of the primer

components. Press machines were used to punch alcohol-moistened foil, which was then placed into the primer cups. The primer mixture/charge, composed of high explosives of unknown composition (possibly nitroglycerine and/or trinitrotoluene) was placed by hand into each primer cup. Next, anvils were pressed over the primer cups, dried in ovens and stored for later insertion into brass cartridges. This information also noted that the explosives were stored within separate powder magazines and shipped into the plant in small quantities as needed for safety purposes. Other materials used would include cleaners, hydraulic oils, and transformer oils. Contaminants primarily associated with the primer-loading operations would include explosives (primer and tracer compounds), nitrates, perchlorates, VOCs, SVOCs, heavy metals, and PCBs.

Building #6 was used for small arms primer insertion from 1941 to 1944. The primer insertion machinery was removed and the building was converted into office space in 1944. The draft EBS report did not indicate any areas of concern associated with the primer insertion processes conducted in building #6 during the 1940's. Similar processes as noted above in Building #5 and previously in this section are thought to have occurred within this building (see above). During 1944 to 1969, a metallurgical laboratory occupied a small part of the first floor of Building #6 and performed quality control testing of the supplied steel, polishing, measuring, and metal etching. The EBS report indicated that liquid wastes were reported to have been disposed down the MSD drains from the laboratory area. In addition, ash from an open kiln was observed during the TetraTech site inspection. The use of the kiln is unknown. Materials used include unidentified laboratory chemicals, solvents, hydraulic oils, cleaners, and transformer oils. Contaminants primarily associated with these operations would include VOCs, SVOCs, explosives (primer and tracer compounds), nitrates, perchlorates, heavy metals, and PCBs.

From 1944 to 1969, Building #7 housed several water pumps used to circulate coolant water between Buildings #2 and #4 and a cooling tower (Building #7A). Water pumps and piping were the only process machinery used. No hazardous materials were identified as being associated with these operations.

The Fuel Storage Area (Building #8) operations included storage and transportation of fuel used by the rotary furnaces and process machinery in Building #2 (Forge Building) from 1944 to 1969. Fuel was transported by pumps located in Building #8A (Oil Pump House) into Building #2. Underground fuel lines originally ran from nine 16,000- to 19,000-gallon aboveground fuel oil tanks positioned within earthen dams located directly north of Building #2. In 1958 (as a result of I-70 construction), the fuel oil tanks were relocated east of Building #2, where it remained until 1986. Currently, the area east of Building #2 is occupied by a parking lot and an electrical substation. An oil drain sump, which was located near the

fuel storage tanks was used to temporarily store dirty return oil from Building #8A oil pumps. In 1986, the tanks were removed and donated to the state of Missouri. Possible contaminants associated with these operations include VOCs (benzene, toluene, ethylbenzene and xylenes (BTEXs), total petroleum hydrocarbons (TPHs), and polyaromatic hydrocarbons (PAHs), metals, and possibly PCBs.

The acetylene generation area (currently a parking lot) consisted of the Acetylene Generator Building (Building #9), the Carbide Storage Building (Building #9A), the Sludge Pits (Building #9B), the Oxygen Receiver (Building #9C), and the Driox Oxygen Converter (Building #9D). Building #9 was built in 1941 and was initially used for transfer of bulk powder into cans. The building was modified in 1944 to include the production of acetylene gas in four generators located in Building #9 by combining calcium carbide and water. The gas was then piped underground to Buildings #2 (Forge Building) and #3 (Machining Building) for various operations. Calcium hydroxide slurry, a caustic byproduct of this process, was stored in two sludge pits east of Building #9. The sludge pits were formerly connected to the sewer system by underground piping. Records indicated that the majority of the slurry was transported off-site by contractors. Materials used during these operations would include smokeless powder, calcium carbide (based on reactivity and flammability), and machining cooling oil; possible contaminants associated with these materials and processes may include VOCs, SVOCs, metals, pH, explosives, and possibly cyanide.

Building #10 consisted of quench oil storage tanks, a sludge pit, and a gasoline tank, which were used as support for the manufacturing processes of the plant. The tanks were used to supply cooling oil to 14 quench oil tanks for metal machining operations within Building #3 through underground and basement piping. All of the USTs and sludge pit were removed in 1993. Approximately 1,500 cubic yards of contaminated soil was excavated after the tanks and pit removal. The draft EBS report indicated that the USTs removal at the SLAAP site has not been finalized. This is a result of MDNR having outstanding issues concerning the UST final closure report and remaining contamination. Materials used during these processes include quench oil, hydraulic oil, solvents, and heavy metals. Contaminants may include VOCs (including BTEXs), SVOCs, metals, explosives and PCBs.

The Foamite Generator Building (Building #11) was used as support in the manufacturing processes of the plant. Foamite was generated in this building in order to fight fires at the SLAAP. Hydrolysate and ferric hydroxide and dry foamite powder were used in this generation process. No hazardous materials were reported to have been associated with this operation.

As a function of national security, an underground tunnel network was constructed, which is thought to have extended under the entire SLOP facility, including the SLAAP site. The existence of these tunnels

has been documented by MDNR and former ATCOM industrial hygiene staff. There were many purposes for these tunnels, which included: national security, firing range, possible explosives detonation ranges, transferral of materials, supplies, and equipment, and projectile/shell production between buildings. In addition, it was probably a mode of transportation for more than 34,000 SLOP workers. There is no knowledge at this time of any sampling having been conducted within the tunnels. Former ATCOM staff recommended that respiratory protection was necessary if the tunnels were to be entered.

Other waste types thought to be present at the SLAAP facility and observed by Tetra Tech includes asbestos and lead paint on and within the majority of the buildings. The extent, health risk, and disposition of these contaminants should be determined. In addition, pesticides were reportedly applied by a contractor. Those chemicals used included Rid-A-Bird (containing fenthion and avitrol with 4-aminopyridine), malathion and the herbicide 2,4,5-T ester. A Dames and Moore report in 1994 indicated finding pesticide (other than what was originally used by contractors) contamination. These two findings bring into question whether pesticides were merely applied or actually stored on SLAAP.

The U.S. Army Toxic and Hazardous Material Agency's, 1979 report noted that all sewage was discharged into the MSD system. Contaminated liquid and solid industrial wastes were collected in all sumps and holding tanks and were reportedly removed by a contractor, recycled, or possibly discharged to the MSD system. Several of the sumps/drains and pits in the SLAAP site were connected to the MSD sewer lines. No hazardous wastes are known to be buried at the SLAAP site, and no demolition or burning ground areas were reported on this facility. The 1979 report also noted that no holding or settling ponds or wastewater lagoons were utilized on this former federal facility, but that collection sumps were common. The report also noted that although there were no records indicating large spills of industrial chemicals or petroleum products, there was evidence of minor spills near valves, joints, and piping. Limited MSD information was available regarding MSD communications and permits. No MSD permits were held until after the mid to late 1960's at the SLAAP site.

Based on information from other federal facility sites, it is common that a method used to dispose of process wastewater and/or shift wash down water was to construct "french drains" and/or "dry wells" to allow wastewater to percolate into subsurface soils. These drains/wells would be constructed fairly deeply into subsurface soils to divert wastewater away from buildings. Further information is needed concerning whether these types of drainage systems exist at the SLAAP site.

It should be noted that SLAAP was a small quantity waste generator under RCRA until December 31, 1997, when the Army deactivated its RCRA status.

## PREVIOUS INVESTIGATIONS

Investigations have been conducted at the site for the remediation of Building #3 and the removal of the USTs and sludge pit (Building #10). The following information was obtained from available files.

Previous investigations of Building #3 pertain strictly to the building itself. Building #3 was originally utilized to finish metal projectile parts as a part of the munitions operations. Metal lathing operations were conducted on the second floor and metal finishing operations were done on the first floor. Both metal lathing and metal finishing operations utilized oil-cooling systems in order to reduce heat. Cutting oils with PCBs exhibited excellent heat transfer qualities and were historically used extensively in similar industrial applications. The specific cutting oil used at SLAAP is not known. An unconfirmed estimate by plant personnel of the PCB content in the cutting oil is that it contained between 50 to 150 parts per million (ppm).

AVSCOM had planned to renovate Building #3 into office space in the 1980's. The following investigation was a result of this renovation effort. On April 24, 1990, Larry Wright, director, Administrative and Installation Support, Department of the Army, AVSCOM sent a letter to Bob Jackson, Toxic Substances Control Section, USEPA Region 7, regarding the removal/disposal by Browning Ferris, Inc. (BFI), of creosote-treated wooden blocks that had been exposed to PCBs. In the correspondence, it was noted that General Services Administration (GSA) samples revealed a maximum of 288 ppm of Aroclor 1248 and that notice had been made to MDNR and EPA on April 6. The letter also outlined the short-term and long-term plans of action, which included removal of all concrete, mastic and wooden blocks, enclosure of file storage area, placement of masonite as a floor, and sampling of concrete subfloor and permanent flooring installation. EPA's May 9, 1990 response letter from Jackson recommended that contaminated areas be sampled and cleaned for future use and that compliance with 40 CFR Part 761 be accomplished with respect to disposition of contaminated equipment.

On January 2, 1991, Bob Kraeger of MDNR inspected Building #3. During this inspection, Kraeger took 16 wipe samples from various surfaces within the building. The results indicated that nine of the 16 samples had regulated levels of PCBs. No samples of the earthen floor or surrounding soils were taken. Subsequently, on February 20, 1991, EPA issued a Notice of Noncompliance TSCA Docket Number VII-91-T-304 for noncompliance with the National Spill Clean-Up Policy (40 CFR 761.125). EPA required that AVSCOM provide documentation of the removal of all contaminated flooring materials, and decontamination/confirmation sampling of nonporous surfaces to less than 10 micrograms/100 square

centimeters, and decontamination/confirmation sampling of porous surfaces to less than 10 ppm. On March 20, 1991, AVSCOM responded to the Notice of Noncompliance by noting how it would accomplish the remediation. In a letter dated May 28, 1993, Jackson of EPA to AVSCOM, Jackson outlined three additional areas that EPA believed should be addressed. Those areas included: 1) remediation of the chip chute wall, chip chute and basement, 2) encapsulation of an area within Building #3, and 3) statistically based sampling of contaminated areas. On June 24, 1996, US AVSCOM submitted to the EPA, Toxic Substances and Control Section a Health Based Risk Assessment (completed by Woodward-Clyde) for Building #3 as a portion of the requirements for the PCB remediation project as a result of the Notice of Noncompliance. In August 15, 1996, the Agency For Toxic Substances and Disease Registry (ATSDR) issued a Health Consult as a result of the Health Based Risk Assessment. This report documented PCBs located in the basement, first and second floors, and asbestos and pesticides in the basement. Soil and wipe samples taken by Dames and Moore (1994 study) from various surfaces in the basement detected 4,4'-DDD, 4,4'-DDT, endrin and gamma-BHC, dieldrin, heptachlor epoxide, and endrin aldehyde. ATSDR concluded that PCB levels (including soils in the basement) within Building #3 may represent a long-term health threat to future workers from direct contact exposures. They also concluded that the pesticides detected in soil samples did not represent a health threat. ATSDR recommended that the risk assessment completed by AVSCOM might not be representative of current conditions in Building #3.

The SLAAP facility had four known areas where USTs were located; east, north, and west of Building #2 and east of Building #3. No information was available regarding the 1958 and 1986 removal of fuel tanks located north and later relocated east of the #2 Forge Building. However, information pertaining to the USTs east of Building #3 was available. Two previous studies were conducted of this site: "Investigation of Underground Storage Tanks," September 1989 by the United States Corps of Engineers and "Underground Storage Tank Investigation," February, 1992 by J.D. Chelan.

The tanks east of Building #3 were reportedly taken out of service when munitions production was terminated in 1969. These tanks were drained of all product and filled with water. The J.D. Chelan report (in support of removal of the USTs east of Building #3) reported drilling 12 boreholes in the vicinity of the USTs in December 1991. From the report, it appeared that soil and tank media contents were sampled on December 11, 1991. The tanks contents were analyzed (for all but tank #105) for PCBs, metals and TPH. Soil samples were analyzed only for TPH and metals. Analytical results for tank contents and soils indicated that TPH was in excess of the cleanup levels. Analytical results for the tank contents indicated that PCBs levels were reported at less than 5.0 ppm for the sludge pit. All other PCB levels for all other tanks were reported at less than 0.001 ppm. This report also noted a black oil stain near Tank #17,

however, no sample was taken. One soil sample collected from an unconnected pipe north of tank #105, which contained a red "solvent-like" material, had BTEX compounds at a concentration of 477,200 ppm. The report concluded that the worst contamination in the UST area appeared to be between Tanks #17 and #87, at the southwest end of Tank #15, and around Tank #105.

A removal conducted by the remediation contractor, Action Environmental Services (from November 1992 through January 1993) included the removal of two gas tanks, #101 and #105, a sludge pit, and three quench oil tanks (#15, #17, #87). During the removal activities, a total of 1,500 cubic yards of soil were excavated and disposed in a landfill. Excavation of the soil was terminated by the remediation contractor at the contractual 1,500-cubic-yard quantity. Seven soil samples, which were analyzed for benzene, toluene, ethylbenzene, xylene (BTEX) and TPH, resulted in elevated concentrations of BTEX and TPH. No additional contamination was noted from any additional Resources Conservation and Recovery Act (RCRA) TCLP metals analyses. Soil samples were not analyzed for PCBs. It was reported during the removal that no leakage was found to have accumulated against the Building #3 foundation or along sewer lines beneath the tanks. It was noted however, that spillage of other contaminants unrelated to the UST removal was present in the excavations areas.

The US AVSCOM submitted to MDNR a Corrective Action Plan in April 1993 in order to finalize the tank removals. The results of the Corrective Action Plan are unknown and MDNR's response letter indicated concerns over remaining contamination.

In February 1999 Tetra Tech conducted an draft EBS for the AMCOM in Huntsville, Alabama. The draft EBS report was prepared to determine the environmental conditions of the property for consideration for acquisition, transfer, outgrant, or disposal. The scope of work for the draft EBS report consisted of the identification of probable areas of environmental concern that may be present on site or on the surrounding adjacent properties and that may pose an environmental liability for the resulting property owner. The draft EBS identified several areas of environmental concern throughout the property. Sampling recommendations were also addressed in the draft EBS report to assess the building-specific and site-wide areas of environmental concern.

no suspected release. The relatively high score for the air pathway is due to the dense population within close proximity of the site. Missing file information and HRS scoring deficiencies are highlighted separately in Attachment 3: HRS Scoring Deficiency Checklist.

## **SOURCE DESCRIPTION**

Limited information exists for the site concerning waste treatment, storage, and disposal practices since its inception as an munitions plant in 1941. Information concerning waste streams and hazardous constituent quantities is considered a data gap and an effort should be made in collecting this information if at all possible. Waste quantity as well as source delineation would most likely change the PA Review after additional sampling has been conducted at the site. Other potential source areas were identified during the file review and will be discussed below. Further sampling would be necessary to adequately document source areas at the SLAAP site. The draft EBS conducted by Tetra Tech resulted in identifying building-specific areas of environmental concern throughout all remaining structures on site. Site-wide areas of environmental concern were also identified during their survey and consist of possible ground water contaminant migration from the PURO Chemical Storage company located south of the site, as well as possible asbestos-containing materials and lead-based paint present in many buildings across the site. START believes that the Tetra Tech site assessment and recommendations were good and should be implemented; however START recommends additional sampling to fully characterize the site identity and potential source(s) and to document potential releases.

Potential sources identified at the site and used for PA Review include the former fuel oil storage area (Building #8), the former quench oil tanks and sludge pit area (Building #10), and the former sludge pit area located adjacent to Building #9. These buildings no longer exist at the property and removal activities have occurred at Buildings #8 and #10, including some soil removal in the former quench oil tanks and sludge pit area near Building #10. Available records and interviews with state officials have indicated that the storage tank removals at the SLAAP site have not been finalized. Previous analytical data has also indicated that a release to subsurface soils and possibly ground water has occurred in the area of the former Building #10. Many other potential source areas may exist throughout the site. The potential source areas identified for PA Review were based on available file information, limited analytical results, and professional judgment.

START suggests that more extensive soil sampling throughout the site and mainly outside the buildings be conducted to adequately assess whether contaminant releases have occurred due to the former operations at the site. Field screening sampling could be conducted to assess potential source areas and to determine the extent of soil contamination for site characterization and for proper removal assessment. Confirmation samples would also be necessary to verify on-site screening samples. Soil sampling may be more extensive in some areas depending on the results of the field screening data. Additional potential sources/areas of concern are listed below with sampling considerations for possible further work at the SLAAP site.



## Data Gaps

**Building #1**—Soil samples should be collected in areas along the outside of building #1 to assess whether any spills or leaks may have occurred. Emphasis should be in areas where wastewater discharged from the building to assess the integrity of the underground piping system. Several pit areas are located within building #1 along the south and southeast walls. These pits or hazardous material off-loading areas formerly discharged directly to the sewer system. Subsurface soil contamination outside of the building may have occurred in these areas. Drilling through the adjacent parking lots (formerly billet storage yards) could be conducted for the collection of a subsurface soil sample from each storage yard. START also recommends that all samples collected within and outside of the building should be analyzed for metals. It was also recommended in the EBS report that samples collected inside of the building be analyzed for VOCs, SVOCs, and PCBs due to solvents, acids, and oils having been used within this building. START also recommends that soil samples collected outside of the building in selected areas be analyzed for the same analytes.

**Building #2**—Perimeter soil samples should be collected around Building #2, with emphasis on fuel oil pipeline areas, the storm sewer catch basins located on the west, south, and east sides of the building, and the fuel oil loading pits once located east and west of the pipeline tunnel, which exited the building on the north. Soil sampling should also be conducted in the vicinity of the former gasoline UST located between Building #2 and Goodfellow Boulevard. Because of the presence of petroleum hydrocarbons, samples should be analyzed for VOCs and SVOCs (including PAHs). Metals should also be added to the analyte list for samples collected in the rotary furnace areas within the building as well as for soil samples collected outside of the building. Selected soil samples outside of the building should also be analyzed for PCBs. Wipe samples should also be collected within the building and analyzed for PCBs and metals due to the forging operations and the possible presence of metals-contaminated dusts.

**Building #3**—Perimeter soil samples should also be collected around Building #3 with emphasis on the four loading dock areas and former quench oil remote fill area located along the north-northeast side of the building to assess potential spills and leaks that may have occurred in these areas. Samples collected from these areas should be analyzed for VOCs, SVOCs (including PAHs), PCBs, and heavy metals. It has also been reported by MDNR that a portion of Building #3 has an earthen floor. Surface and subsurface soil samples should be collected in this area and analyzed for pesticides, metals, and PCBs. Metals should be added to the analyte list for soil and wipe samples collected in the basement of Building #3, particularly in the area of the former "chip chute" area. In addition to the soil-boring sample collected within the sewer and solvent room drain connection, all other floor drains should be assessed and possibly sampled to determine whether building-related contaminants are remaining in these areas and contaminating the deeper soils.

**Building #4**—It was recommended in the EBS report that soil samples be collected within the former motor pit areas located in Building #4. START suggests that additional surface soil samples (if possible) be collected along the exterior of Building #4 in the areas of the former transformer storage area located at the southeast corner of the building to assess whether any leaks have occurred. Further, three to four soil samples should also be considered along the pipe vault and outlet areas located along the east and west sides of the building. All samples collected within and outside of Building #4 should be analyzed for VOCs, SVOCs, and PCBs.

**Building #5 and Building #6**—The EBS report indicated very minimal sampling within Buildings #5 and #6. Recommendations included the sampling of ash in the open hearth/kiln area in Building #6

and spilled oil in Building #5. Historically, these two buildings were utilized for primer (small cap/tube containing an explosive) insertion operations from 1941 to 1944 for the production of small (0.30-mm) caliber munitions. START recommends that wipe samples be collected within the building and that soil samples be collected along the perimeter of the building; all samples should be analyzed for explosives (primer and tracer compounds), nitrates, and perchlorates. Selected soil samples should also be analyzed for VOCs, SVOCs, heavy metals, and PCBs because of the use of solvents and oils used in the primer insertion processes and the presence of transformers. Additional historical information should also be collected concerning the manufacturing of the 0.50-mm caliber munitions to assess the processes involved in its production. Information concerning the manufacturing processes of the Future Company (produced pocket-sized radios) and the former metallurgical laboratory located in Building #6 should also be collected and evaluated for additional sampling.

**Buildings #8 and #8A**—Subsurface soil samples should be collected in the former fuel oil storage area (formerly the location of nine fuel oil ASTs and oil pump house) and in the former underground fuel oil piping system/tunnel, which connected with Building #2 (Forge Building) and Building #8A (Oil Pump House). Currently, the area east of Building #2 is occupied by a parking lot and an electrical substation. The EBS report indicated collecting subsurface soil samples in these areas from five soil boring locations. START recommends collecting additional subsurface soil samples in these areas utilizing a Geoprobe™ hydraulic unit and mobile laboratory for screening of BTEX compounds to assess the full extent of subsurface soil contamination. Subsurface soil samples should also be collected and screened for BTEXs south and southwest of the former electric substation, because this area also formerly housed the fuel oil storage area. Surface soil samples (if possible) should also be collected around the perimeter of the electrical substation and screened for PCBs analyses. Confirmation soil samples should be collected and submitted to a laboratory for VOCs, TPHs, SVOCs, metals, explosives, and PCBs analysis.

**Buildings #9 and #10**—Currently, the area where Building #9 (Acetylene Generation Area) and Building #10 (Quench Oil Tanks and Sludge Pit Area) were situated is a paved parking lot. The EBS report indicated collecting one subsurface soil sample at the sludge pit area (Building #9B) and four subsurface soil samples along the perimeter of Building #10. START recommends that additional soil borings be completed in all former sludge pit and gasoline and quench oil tank areas for a total of seven subsurface soil samples. Samples may also be warranted in areas where underground piping is located which connected this area with Building #2 (Forge Building) and #3 (Machining Building). Previous investigations have indicated elevated BTEXs and TPH concentrations in the area of Building #10, and MDNR has indicated some concerns that the previous UST removal investigation was not adequate and contamination may remain in the area. Samples could be collected with a Geoprobe™ hydraulic unit and screened for BTEX and PCB compounds to determine the full extent of subsurface soil contamination in the areas of Buildings #9 and #10. Confirmation soil samples should be collected and submitted to a laboratory for VOCs, TPHs, SVOCs, PCBs, metals, and explosives.

It has been reported by MDNR and a former ATCOM employee that an underground tunnel system extends under the entire SLOP facility, including the SLAAP site. Further assessment of this tunnel system is warranted and selected soil samples should be collected and at a minimum analyzed for metals and explosives due to the existence of firing and explosive detonation ranges. In addition, "french drains and/or dry wells" may exist on the SLAAP site and warrant further investigation as to their existence. If

buildings (i.e., Buildings #3, and #8) may be occurring due to former federal facility operations. An additional monitoring well should be installed along the northern and eastern property boundary to assess downgradient (off-site) ground water quality. This would help determine whether a ground water release is occurring off-site relative to ground water flow. The installation and sampling of temporary Geoprobe™ wells could be utilized for ground water characterization. The wells installed along the eastern and southern property boundary would be adequate locations for background wells. A thorough on-site geologic evaluation to determine the stratigraphic characteristics, including confining units, should also be further evaluated at the SLAAP site. .

## **SURFACE WATER PATHWAY**

The closest surface water of significance is the Mississippi River, located about 2.65 miles downstream to the east of the site. Flooding is also not a concern at the facility, as it is located near a topographic high. The exposure threat to any potential targets along the Mississippi River would be low due to the distance of the Mississippi River (> 2 miles) and the high dilution factor of the river (> 10,000 cfs). It has been reported that a number of the buildings contained subfloor drains, pits, and underground piping, which eventually discharges to the St. Louis MSD system. In addition, surface drainage from the site during rainfall events eventually discharges to the St. Louis sewer system. File information was not found regarding historical compliance with MSD permits. The facility is currently inactive. No primary targets were evaluated. .

### **Data Gaps**

An assessment to verify whether a site-related release has occurred should be made. The draft EBS report indicated sampling at direct discharge points from areas within the buildings (i.e., pits and piping directly connected to the sewer system in several buildings). These discharge points warrant sampling as well as any other identified sewer inlets/catch basins located outside of the buildings and utilized during high rainfall events to collect surface drainage from the site. These surface water samples would verify contamination (if present) prior to discharging into the St. Louis MSD system. Sampling surface water targets (Mississippi River) does not appear to be warranted. Additional information is needed concerning the facility's combined storm/sanitary system layout and construction.

## **AIR AND SOIL EXPOSURE PATHWAYS**

The potential for an air release via the site is considered low. The air pathway score is relatively high due to the dense population in the vicinity of the site. The total population within 4 miles of the site, as determined by the Geographic Modeling System (GEMS) database, is about 264,235. Approximately 17,928 people reside within a 1-mile radius of the site. Historically, air emissions from plant operations may have caused soil contamination; however, the facility is currently inactive.

Limited analytical data exist for the site documenting surface and subsurface soil contamination. File information indicated soil contamination in some areas at the site (i.e., Building #10); however, a cleanup and removal of soils has been conducted. Soil contamination is suspected in areas across the site. Additionally, due to the presence of tunnels underneath the SLAAP/SLOP facility, there is the potential for subsurface soils within this underground pathway to be contaminated as a result of the variety of usages. It should be noted that during the site visit conducted by Tetra Tech, no visible signs of surface soil contamination were identified. The majority of the facility is asphalt and concrete covered with about a total of about 3 acres of grassy/soil areas.

Since the full extent of contamination has not been totally identified at the SLAAP site, it is difficult to assess whether any residential targets are situated within 200 feet of a contaminated source area. Residential properties do exist directly to the west and northwest. This area has been residential ever since the construction of the SLAAP facility in 1941. A school is located about 500 feet southwest of the site. These properties warrant sampling based on knowledge of the SLOP/SLAAP operations. There are no workers currently on site; however, a draft EBS evaluation to determine environmental conditions at the SLAAP is being conducted for possible property transfer, acquisition, or disposal.

### **Data Gaps**

An evaluation of the underground tunnel network should be conducted at the site. This evaluation may warrant soil and air sampling to assess the environmental hazards of the tunnels. Surface soil samples (0 - 2 feet) should be collected within 200 feet of potential workplace areas to assess the exposure to any future on-site workers/residents of the property. These soil samples would also help in assessing source characterization. Residential targets (nearby homes and schools) need to be further evaluated and may also warrant sampling.

## CONCLUSIONS AND RECOMMENDATIONS

Based on the available information, further action should be taken at the SLAAP site at 4800 Goodfellow Boulevard. Previous investigations as well as the draft EBS investigation have indicated potential areas of environmental concern within site buildings and in areas of former buildings. In addition, it has been reported that the facility had poor waste handling practices. Future work should include sampling in areas addressed in the draft EBS investigation to assess potential environmental liabilities associated with property transferrals. In addition, sampling outlined in this memorandum should be considered to better assess whether releases have occurred due to past operations and to identify the extent and migration of contamination. START recommends that surface and subsurface water, and ground water sampling be conducted to confirm or deny the presence of contamination. Background samples for all media would also be needed to establish appropriate background concentrations. Sampling parameters should consist of VOCs, SVOCs (including PAHS), TPHs, total metals, explosives (primer and tracer compounds), nitrates, perchlorates, PCBs, and pesticides. An evaluation of the tunnel network should be completed to assess whether any health concerns exist. These tunnels should be considered a part of the infrastructure of this site with respect to the environmental liabilities and subsequent remediation efforts.

A low exposure threat appears to exist for ground water and surface water targets. An exposure threat to surface water is minimal due to the 2.65 mile downstream distance from the site and the high dilution factor of the Mississippi River.

In addition, a low exposure threat via air appears to exist; however, an exposure threat may exist for any future workers/residents that may work/reside on the property. An assessment of the exposure threat would be better evaluated after on-site sampling is conducted and the future land use of the property is determined. Nearby residential properties may also warrant sampling due to the past operations at the site.

### Attachments:

1. Figures 1 and 2
2. (deleted from handout as part of draft HRS scoring information)
3. HRS Scoring Deficiency Checklist

## **ATTACHMENT 1**

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**Figure 1 and 2**

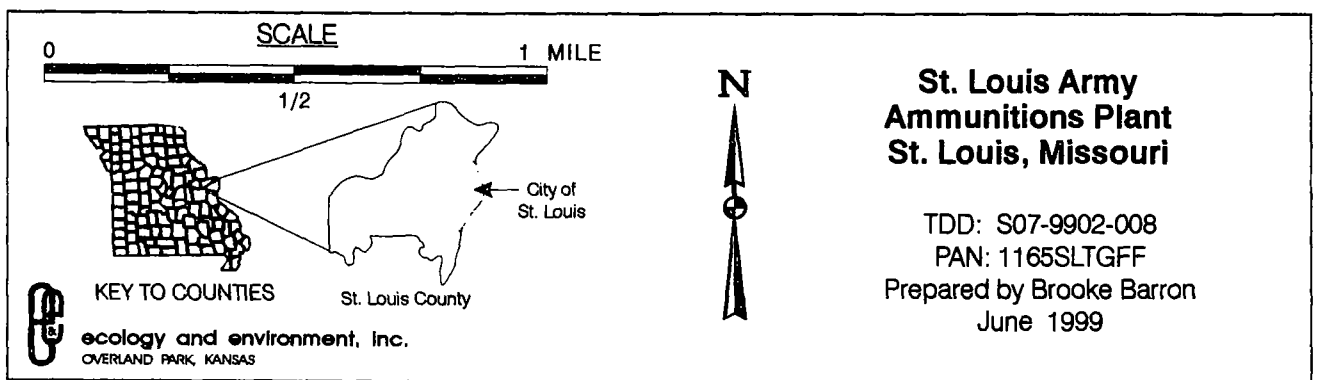


Figure 1: Site Location Map

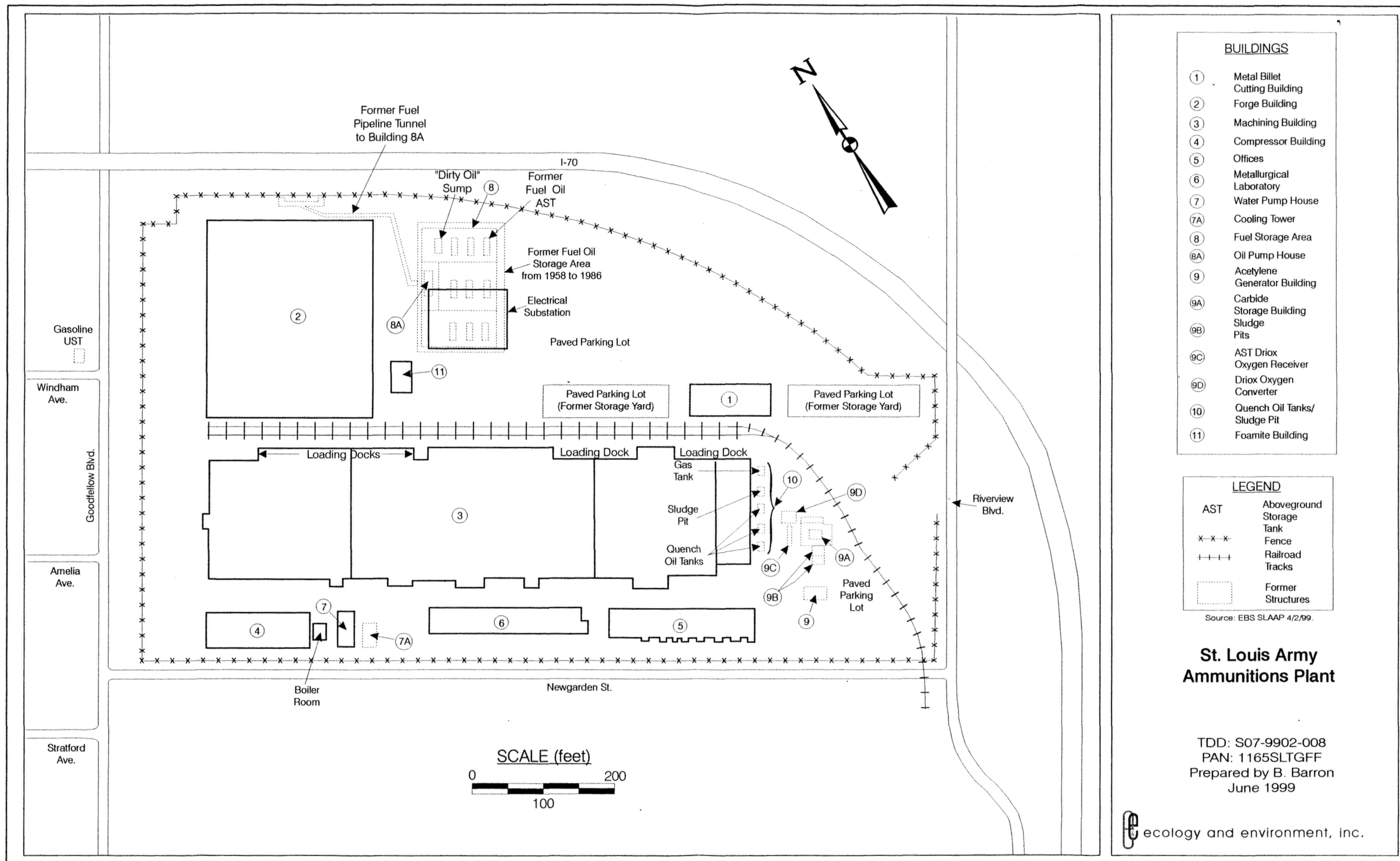


Figure 2: Site Map



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were not identified. START estimated some source areas for PA scoring purposes.

3A1.- SLAAP indicated that the closest private drinking water wells were about 3 miles from the site, but did not note owner or depth. START research determined that two private drinking water wells are located within the three mile radius.

3C.- SLAAP indicated closest private water wells were beyond 3 mile radius. START research determined two private water wells are located within the three mile radius.

3D.-No population was determined by SLAAP for the water wells. START estimated population drawing from each water well based on 1990 Census data.

3E.-SLAAP provided a general description of the groundwater flow direction from the site.

3F.-The EBS did indicate some geological information; however hydraulic conductivities and depths to aquifers was not provided. Reference concerning geology and hydrogeology was not provided.

4A.-SLAAP did not provide a map of the site which included surface water bodies downstream from the source(s) and did not show the relationship of the site to surface water bodies receiving drainage. START inferred this information for PA Score purposes.

4B.-SLAAP did not include a map or describe the probable surface water runoff pattern from each potential source to surface waters.

4E.-The only target information provided was the identification of two wetland areas near the site. These wetland areas are not contiguous to a surface water body. Surface water sampling was not conducted and there was no information concerning surface water intakes sensitive environments, or fishery areas along the Mississippi River. It should be noted that the closest surface water body (Mississippi River) is located greater than 2 miles away.

5A - No information was provided regarding air releases to the atmosphere.

5D -Some wetland information was provided, but are located greater than 1 mile from the site.

6A.- SLAAP approximately described, through UST remediation documents, contamination within 2 feet of the ground surface. Areal extent was not included in any discussion. START inferred this information in the PA Score.

6B.-The EBS report noted potentially contaminated areas (mainly within buildings). Depths of UST confirmatory soil samples and results were not available.

6C.- No background soil samples were taken.

6D.- File information and the EBS report did not indicate closes residence or school within the vicinity of the site. START estimated approximate distances.

\* NOTE: Where information is provided but not acceptable, discuss briefly, why the information is not acceptable.